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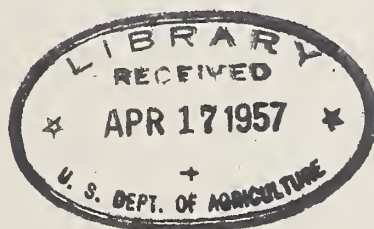
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MARKETING EAST TEXAS TIMBER PRODUCTS

By
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July 1947

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By G. R. Gregory
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Intensive forestry requires good markets for a variety of wood products. Therefore, as a part of its research on intensive forestry methods and problems, the East Texas Branch^{1/} of the Southern Forest Experiment Station has begun a study of forest-products markets in East Texas. In addition to their value in guiding the research program, the results of this study are of value to forest landowners and others. To serve the interests of these people, this report, embodying some of the findings of a preliminary market survey made in the summer of 1946, is being released. Products from East Texas forests are discussed together with prices received for them in 1946. An appendix charts the principal markets for pine and hardwood timber and lists specifications commonly used for several of the products.

General Market Conditions

East Texas offers a large and varied market for timber products of nearly all kinds, though it lacks slack cooperage and furniture veneer plants and its fuelwood market is poorly developed. In general, all manufacturers reported a shortage of raw materials in 1946. Hardwood markets were usually better supplied than pine, yet there was an acute shortage of the high-grade hardwoods (ash for handles, white oak for staves, etc.). Since the survey was completed demands have continued high for all except lower-grade upland hardwoods.

Prices are also high—a direct reflection of the unprecedented national demand for all types of wood products. The weakened local market for low-grade hardwoods, however, is making it difficult to find buyers for stumpage in this class. Low-grade hardwoods are thus the most difficult marketing problem at present, with little prospect of general improvement unless purchase of hardwood pulp becomes common practice or other outlets are found for these trees.

For many items a considerable price differential was found between northern and southern East Texas. Probably the difference

^{1/} Operated in cooperation with the Stephen F. Austin State Teachers College, Nacogdoches, Texas.

was due largely to the relative scarcity of timber and resultant high competition in the northern section. (In this report the southern boundaries of Anderson, Cherokee, Nacogdoches, and Shelby Counties are taken as a rough dividing line between north and south East Texas.) Considerable local variation was also found. When the survey was made, prices for most finished forest products were controlled by the Office of Price Administration. After controls came off, some changes in the prices of forest raw materials occurred. Pulpwood prices in December 1946 were about 20 percent higher than under OPA, but stumpage, sawlog, pole, piling, and veneer log prices were relatively unchanged. Unless otherwise noted, prices given in the following sections are those which were in effect during price control.

Markets naturally overlap a good deal. For example, some sawmills manufacture handle squares and box shooks along with lumber; some hardwood mills sell their veneer-quality logs to box and basket factories; most tie mills sell considerable quantities of side lumber. The following discussion of each type of market tries to cover: (1) description of product; (2) specifications for raw materials; (3) unit of measure employed; (4) usual method of purchase and radius of active purchasing; (5) minimum quantity accepted at the plant; and (6) current prices.

Saw Timber

Pine sawlogs

The principal product of the larger East Texas pine sawmills is dry, surfaced, pine construction lumber. Small mills usually sell rough green lumber to a concentration yard--a planer mill or a larger sawmill--to be dried and finished. The strong current market has resulted in extremely high competition for pine stumpage and sawlogs. Portable mills frequently set up for 100 M board feet--and occasionally less. Because of their marketing practices, some of these small mills have been able to offer very high prices for pine stumpage (up to \$30 per M). The portable mill concentration is heaviest in northern East Texas, and here the highest stumpage prices were reported.

Portable and small stationary mills seldom have quality or size specifications for pine sawlogs. Logs as small as $4\frac{1}{2}$ inches in top diameter are often sawed. Six inches d.b.h. might be taken as a rough minimum tree diameter limit. Lengths range from 8 to 24 feet. Larger mills, with higher operating costs, usually cut to a minimum of 8 or 10 inches d.b.h. A few concerns owning considerable stumpage reported a cutting limit of 14 inches d.b.h.

Pine stumpage is bought in a variety of ways: (1) by lump sum or boundary sales in which the owner is paid a stated amount for all timber on a specified area--with or without a minimum-diameter cutting limit; (2) by outright purchase of the timber and land; (3) by log scale, in which case the Doyle scale is almost always used (except for

national forest sales). Usually either one or both bark thicknesses are included in applying the Doyle scale. In northern East Texas both barks are quite commonly given, while in the southern section "give one and take one" is the more usual practice.

The distance that mills reach out for logs varies greatly with road conditions and with quality and scarcity of timber. The hauling limit for most operations is about 30 miles, but on good roads some outfits haul up to 75 or even 90 miles. Stumpage prices vary with accessibility, quality, competition, etc., and commonly range from \$8 per M to over \$25 per M (Doyle scale).

Most mills will purchase pine sawlogs delivered to the mill or bunched at the roadside. The Doyle scale is used in such transactions, and although no quality grades are fixed by mills, the price varies roughly according to log quality and competition. Prices for logs delivered at the mill range from \$23 to \$35 per M. Prices for logs at the roadside average about \$20 per M, varying with quality and hauling distance.

Few mills accept logs delivered in less than truckload lots. Various factors influence the minimum volume of logs that mills will purchase at the road, but the quantity must be sufficient to carry loading and trucking charges.

Hardwood sawlogs

The multiplicity of species and qualities found in southern hardwoods has diversified the hardwood market much more than that for pine. Many of the larger hardwood mills act as concentration yards for the rough lumber sawed by small mills. A few concentration yards do no sawing whatever but instead dry, dress, and grade the lumber from several small mills.

The products of East Texas hardwood mills range from rough green lumber through finished lumber and flooring, to finished dimension stock such as glued-up table tops and chair legs. For top-grade hardwood, demand and competition are high. The market for low-grade hardwoods--the "hill" hardwoods--has fallen off considerably since August 1946.

Stumpage and log buying practices of hardwood mills resemble those of pine mills. The Doyle-Scribner scale is commonly used, with inside bark measurement the usual scaling diameter. Defect is much more important than in pine. A 12- or 14-inch minimum tree diameter limit is frequently stipulated by the buyer of hardwood stumpage--not the seller.

Stumpage prices for good hardwood vary from \$8 to \$15 per M b.f. Pine mills that also cut hardwood usually buy hardwood stumpage only when it is mixed heavily with pine. Occasionally a timber tract is sold with a set price per M for pine and the provision that the buyer may cut any of the hardwood he wants free of charge. Many operators

will not buy upland hardwood in mixed stands unless at least 30 to 50 percent of the volume is pine.

Prices for hardwood logs delivered at the mill ranged from \$17 to \$30 per M. Prices for logs bunched at the roadside vary greatly with hauling distance, quality, and quantity, but average about \$20 per M.

Pulpwood

At least seven paper mills draw pulpwood from East Texas. Two of these are in Texas, two in Arkansas, and three in Louisiana. They manufacture a wide variety of paper products, newsprint, magazine paper, and many types of containers. Two of the mills use some hardwood pulpwood. A third uses only hardwood. Other companies have made trial runs with various hardwoods and may undertake large-scale production involving hardwood pulp of one or more species groups in the future. At the present, however, at least 90 percent of the pulp is from pine.

Usually each company has a wood-procurement division responsible for keeping the mill supplied with pulpwood. A contracting system is set up, with each contractor enjoying a company monopoly within his closely defined territory.^{2/} The contractor may cut his own pulpwood or may sub-contract for its production, but in either case all pulpwood originating within his territory and sold to his company is credited to him. He is the only man who is paid the full mill price. And though he may contribute nothing to the production of some of it, he receives some payment for every cord shipped from his region.

Although territorial boundaries eliminate rivalry between contractors of the same company, competition between contractors of different companies is very keen. Demand has been high and most plants have plans for further expansion. The head of one wood procurement division, when asked about the extent of his timbershed and where it touched the timbershed of other companies, replied, "They don't touch--they don't even overlap--they are superimposed one on the other." Moreover, competition for pulpwood stands is not confined to that existing between pulp companies. Throughout East Texas, and particularly in the northern section, the pulpwood contractor's greatest rival is the portable sawmill operator. Because of their extreme mobility and the small logs they are able to cut, many portable mills operate in excellent pulpwood stands. With the high prices obtained for lumber, these mills have been able to make offers for stumpage that pulpwood contractors could not match.

Most pulpwood is cut into 5-foot lengths, with stated maximum and minimum diameters of 22 inches and 4 inches respectively. One company specifies 4-foot lengths. The standard cord is the usual unit of measure, and prices are adjusted for differences in length. Thus, a cord

^{2/} During the war several mills purchased all wood delivered to their yard by any producer, but conditions are now returning to the normal contractor set up.

of 4-foot wood (4' x 4' x 8') contains 128 cu. ft., while a "unit" of 5-foot wood is a stack 5' x 4' x 8' or 160 cu. ft., or 5/4 cord.

Pulpwood stumpage is purchased in several ways. Timberlands are sometimes bought outright. Often timber-cutting rights are sold to contractors for lump sums or by the cord. Cut pulpwood is purchased delivered at the mill, at the railroad siding, at the roadside, or stacked in the woods. If the pulpwood is purchased stacked in the woods, the unit of measure is usually a "pen"--a hollow square of sticks. Four pens of 5' wood stacked 6 feet high are normally considered a cord.

Pulpwood hauling is usually broken into two steps, the truck haul and the rail haul. The average maximum truck haul to a rail siding is about 20 miles, although this is often exceeded, particularly when other products are cut along with pulpwood. The length of rail haul is governed chiefly by the prevailing freight rate. Differences in prices paid for pulpwood are often the result of differences in freight rates. When wood is hard to get, pulpmills reach out as far as necessary for their supplies, while easy procurement shortens their rail hauls. In East Texas at the present time rail hauls of over 100 miles are not infrequent.

Contractors normally require from 3 to 5 cords per acre for a cut. Minimum acceptable quantities of stacked or penned pulpwood depend entirely on the individual contractor, the pressure of his other work, and the availability of equipment. Some contractors reported that they would send out a truck for as little as one load (2 - 2½ cords) of pulpwood; others required enough for a day's operation and a few even more.

Average prices for unpeeled pulpwood as of August 1946 at various points of delivery are given in Table 1. (To convert stated cord prices to unit prices, multiply by 5/4.) By December 1946 pulpwood had advanced in price to about \$11.50 per cord delivered at the mill, and other prices had advanced accordingly. Pine stumpage was about \$2.00 per cord.

Table 1.--Average pulpwood prices, August 1946

Product	Unit of measure	Point of purchase	Average price
Pine stumpage	Cord	Woods	\$1.50
Hardwood stumpage	Cord	Woods	.80
Pine pulpwood	Pen, 4'	Woods (stacked)	.80
Pine pulpwood	Pen, 5'	Woods (stacked)	1.00
Pine pulpwood	Cord	Stacked at roadside	5.00
Pine pulpwood	Cord	Deliv'd at rail siding	7.50
Pine pulpwood	Cord	Deliv'd at mill	9.75

Poles, Piling, and Fence Posts

Treating plants buy nearly all of the poles, piling, and pine posts produced commercially in East Texas. Poles and piling are highly standardized products, and prices for the raw forest material vary but little throughout the State. Production of treated fence posts was practically halted by the war and has not yet returned to normal. Farmers want and need durable posts, but treating plants found poles a more profitable use for their limited supply of creosote. Posts brought in by individual farmers are occasionally treated, but more as a special favor than as a commercial operation. Most treating plants will buy all the fence posts delivered to their yard, but few are being produced outside of limited areas in southern East Texas. Two reasons are given: (1) labor shortage--since posts require peeling and pulpwood does not, operators prefer to sell pulpwood; (2) ceiling prices for posts were low and gave little incentive for production when compared with pulpwood.

Demand for poles is very high, particularly for classes 5, 6, 7, and 8, used by the Rural Electrification Administration. Large poles are usually handled only on special order, and so demand for these varies from month to month at individual treating plants. To increase pole production with their limited labor supply, several treating plants have installed pole peeling machines. These plants now accept unpeeled poles, deducting one or two cents per linear foot from the delivered price. During the war, long piling was in great demand, but now many operators limit the proportion of piling allowable in any pole and piling operation, and this piling must be in the shorter lengths. Competition exists among pole operators, but is greatest between pole men and sawlog men.

There has been no official change in the grade classifications or specifications for poles, but nearly all operators report a general lowering of standards for all classes. Specifications for poles and piling are given in the appendix (pages 21-26).

Poles, piling, and posts are frequently shipped long distances by rail, but truck hauls are limited to around 20 miles. Most plants, although preferring truckload lots, will accept single poles or posts if delivered at the plant.

Poles and piling are usually purchased through a contractor. The contractor, either company-affiliated or independent, buys cutting rights or stumpage, cuts, peels, and hauls the poles to the plant. Stumpage is usually paid for by the piece at a certain percentage of the delivered price. This percentage varies with the size of pole and averages about as follows:

Poles 16 to 40 feet: 33 percent of ceiling price
Poles over 40 feet: up to 50 percent of ceiling price.

Occasionally short poles are bought by the linear foot or by the stick. Some companies have detailed percentage scales to apply (as stumpage) for every 15-foot change in length, the percentage increasing with the length of the pole.

The last ceiling prices issued are given in Table 2.

Table 2.—November 1946 ceiling prices for clean-peeled pine poles,
f.o.b. producer's shipping point

Length (feet)	C l a s s									
	1	2	3	4	5	6	7	8	9	10
	Dollars									
16	...	...	...	...	0.80	0.70	0.55	0.65	0.55	0.45
18	...	...	1.30	1.15	.95	.85	1.00	.80	.90	.35
20	2.00	1.75	1.50	1.35	1.15	1.00	.85	.90	.80	.70
25	3.50	3.00	2.75	2.50	2.25	2.00	1.75	1.85	1.60	1.40
30	5.10	4.35	3.85	3.60	2.85	2.60	2.20	2.35	1.90	...
35	6.20	5.70	4.95	4.30	3.70	3.00	2.75	3.20	...	...
40	7.50	6.25	5.75	5.10	4.40	3.80	3.35	...	...	...
45	10.00	8.25	7.50	6.25	5.30	4.75	4.25	...	...	...
50	12.25	10.75	9.00	8.50	7.00	6.50	5.50	...	...	...
55	15.20	13.45	11.45	10.45	9.45	7.70	...	...	...	...
60	19.90	16.90	15.40	14.40	13.40	12.40	...	...	...	...
65	26.25	22.50	20.50	17.50	16.50	...	...	...	...	...
70	33.75	28.25	26.25	23.50	21.25	...	...	...	...	...
75	42.50	36.25	31.75	30.50	...	...	...	...	...	...

Piling is usually bought by the linear foot, with prices varying by diameter. Most piling now being produced is in the shorter classes and the price averages about 14¢ per linear foot. Treating plants usually turn out long piling only on special order.

Posts are usually purchased by the piece, with farm production accounting for most of those now reaching local markets. Ceiling prices for clean-peeled pine posts, delivered to the plant or loaded in cars at the producer's loading-out point, are given below:

	<u>6-foot post</u>	<u>7-foot post</u>	<u>8-foot post</u>
3" top	12½¢	14¢	16¢
4" top	14¢	16¢	18½¢
5" top	15½¢	18¢	21¢
6" top	17¢	23¢	29¢

Cross Ties

The tie market in East Texas is large and well developed, with several companies buying and treating ties for major national railroads. When it leaves the treating plant, the tie is ready to be laid in place.

The heavy wartime freight traffic increased the number of tie failures. Most railroads were unable properly to maintain all their track mileage and instead concentrated on those sections receiving heaviest use. Because of this deferred maintenance and the unusually favorable financial condition which most railroads enjoyed at the end of the war, the tie market has been very strong. It was, however, not quite as strong in early 1947 as in 1946.

The current shortage of creosote has also affected the tie market. Independent treating plants which normally purchase and treat substantial numbers of ties prefer to treat poles or piling with their limited creosote supply and have reduced their tie purchases accordingly.

Normally the major tie procurement companies and railroads handle through a single buyer all ties purchased in a locality. These buyers purchase all ties delivered to their yard, frequently assist the better producers in locating timber, and occasionally help to finance them. Independent treating plants often buy any and all ties delivered to their plant.

Competition between tie buyers is not particularly keen. At present, most of the competition for stumpage comes from the portable sawmill and the pulpwood contractor, particularly the former.

Both hewn and sawn ties are produced in East Texas. The latter are most commonly cut by small mills, although some of the larger sawmills also cut ties. In northern East Texas most ties are of hardwood but southern East Texas makes a fair percentage of pine ties. Tie hacks seldom make ties from hickory, simply because the wood is too tough. Mills, although preferring species easier to saw, seldom balk at taking hickory. Tie mills also produce rough lumber from the side of the log—"side lumber" or "side cut." The proportion of lumber varies and is often adjusted to take advantage of lumber prices. During this past year several tie mills have been cutting only lumber, but normally the production of 100 ties yields about 1,200 board feet of side lumber.

Standard specifications for ties are given in the appendix, pp. 27-30. Tie stumpage is purchased by lump sum, by cutting rights, or by the piece. By experience the tie buyer knows about what a particular tract will cut out, and his maximum lump price usually works out to not more than 25¢ per stick. The small, extremely

portable outfits might set up for 5,000 ties, but the average tie mill needs about 10,000 to make a profitable set-up. If a crew is to hack ties, about 20 ties per acre are needed. When tie making is combined with a pulpwood operation, 10 ties per acre may be sufficient. Hewn ties are hacked in the woods, then hauled to the tie yard where they are paid for by the piece.

In purchasing ties by the piece, two methods are common: (1) a stated price (averaging 25¢ per tie) is paid as stumpage for each tie produced from the tract; or (2) the timber owner is paid from 20 to 25 percent of the "ticket," the tie buyer's receipt from the parent company. On large tracts of timber this percentage is usually about equal to the price of 25¢ per tie. Where the timber is small and yields a high proportion of No. 1 and No. 2 ties, the 25¢ per tie gives the higher return. If the timber is large, and bigger ties (Nos. 4 and 5) are produced, the "25 percent of ticket" usually gives the higher return.

Recent ceiling prices for ties delivered at the yard are given in Table 3. In these prices, "oak" includes all oaks, ash, and hickory. "Gum" includes all other hardwood species except cottonwood and willow.

Table 3.—Recent ceiling prices for delivered ties					
Grade	Size	Pine	Mixed hwd.	Gum	Oak
----- Dollars -----					
1	6 x 8, 6" face	0.60	0.60	0.60	0.65
2	6 x 8, 7" face	.80	.80	.85	.90
3	6 x 8, sq. edge	.95	.95	1.00	1.05
4	{ 7 x 9, 8" face } { 7 x 8, sq. edge }	1.15	1.15	1.20	1.20
5	7 x 9, sq. edge	1.25	1.25	1.30	1.30

There is practically no minimum quantity for selling ties. Several treating plants reported they would purchase single ties if farmers wanted to haul them in. Most tie buyers will do the same.

Box, Basket, and Crate Material

The widespread container industry of East Texas may be divided into veneer-using and lumber-using branches. Many box and crate manufacturers employ both processes, but baskets are made exclusively of rotary-cut veneer. Output includes wire bound boxes of all sizes, tomato lugs, potato crates, citrus fruit containers, round 2-ply food containers, and baskets from 1-pint berry boxes to 2-bushel sizes.

Demand for containers of all types is at an all-time high. Local labor shortages have hampered some plants, but the labor situation is easing. Competition for raw materials is only moderate for those concerns utilizing hardwoods, but it is very stiff in the pine-using branch of the industry. Normally sawmills would not compete greatly for the low-grade logs from which box lumber is usually cut, but now portable sawmills take much of this pine away from box factories.

Raw material requirements of the industry vary from plant to plant and from season to season. Some tomato lug factories close down entirely during late summer and fall. Hardwood logs and bolts of box veneer quality are frequently hard to obtain during the winter months when bottomlands are inaccessible; and prices for delivered, or easily accessible timber, are usually highest during this season.

Gang mills are being introduced as a labor saving measure in box lumber production and seem to offer considerable promise. One easily portable, circular gang mill required a maximum of seven men to operate yet turned out about 25,000 feet per day, mill tally. A completely portable mill was being built by one company, mounted on a trailer bed so that it could be set up for operation in less than half an hour. Portability such as this, if it becomes sufficiently widespread, will change the entire marketing procedure for pine box material. New types of lathes may do the same for the hardwood-using branch of the industry. Recently installed machines now turn bolts down to a 3-inch core, and one completely portable veneer plant mounted on a truck is now operating in central East Texas.

Specifications for box lumber vary from plant to plant. Both gang and carriage saws usually cut 8-foot logs. Diameter limits for gang mills average about 14 inches maximum and 6 inches minimum. Carriage saws seldom have any maximum diameter limit, but usually specify a 6-inch minimum top diameter. Both gang and conventional mills, however, cut logs as small as $4\frac{1}{2}$ or 5 inches in top diameter.

Both pine and hardwood veneers are cut for box and basket material, although in East Texas hardwoods are more commonly used, particularly for baskets. Most companies cut oak only when they cannot secure enough softer hardwoods. Cottonwood is the most desired species, followed closely by gum. Hickory is nearly always rejected because of its extreme hardness. Veneer logs and bolts are not graded, but all companies refuse knotty timber. Certain plants refuse all upland or hill hardwoods, and all prefer timber from the bottoms. All veneer logs and bolts must be sound, since rotten hearts will not hold the lathe spurs.

Size of the bolt depends on the product and the design of the lathe. Some of the lengths commonly used are 33, 37, 40, 46, 54, 63, 68, and 72 inches. The minimum diameter for veneer bolts is usually 12 or 14 inches, and maximums run from 38 inches up.

Logs are bought in standard lengths or in multiples of bolt sizes. One company buys long logs (up to 28 feet) and cuts them into bolts with a power drag saw. Most companies now buying logs buck them into veneer bolts in their yard with chain saws. Because specifications change from time to time, they should always be checked before cutting any logs or bolts for a particular mill.

A few of the larger plants own enough timber to supply their needs. Most companies, however, gladly buy logs from any available source. Usually the logs are cut and delivered by independent contractors, though some concerns have their own logging crews and trucks. Practically all companies buy logs or bolts delivered to their yard in minimum lots varying from single logs to a truckload. Truck hauls of over 30 miles are considered impractical in most operations, but considerably longer rail hauls were reported.

The unit of measure varies with the method of purchase. Logs and stumpage are most commonly bought by the Doyle-Scribner or Doyle scale. Veneer bolts are often measured by these same rules with special sticks made up for particular bolt lengths. One mill paid by the piece for all delivered logs, with prices stepped up by 1-inch diameter classes.

In general, the container companies pay slightly higher prices than sawmills for their raw material. Boundary sales are common, though many tracts are purchased on log scale. Pine stumpage prices range up to \$25 per M during the winter when logs are scarce. Reported hardwood stumpage prices varied from \$8 to \$20 per M, averaging about \$14. Pine logs delivered to the mill ranged in price from \$30 up to \$40 per M, Doyle-Scribner scale, averaging about \$35. Delivered hardwood log and veneer bolt prices were about the same, varying from a low of \$30 up to \$40 and more for good cottonwood or gum, and averaging about \$37 per M Doyle-Scribner scale.

Cooperage Material

It is unfortunate that there are no slack cooperage plants in East Texas. They would be a good market for some low-grade hardwoods not merchantable as sawlogs. Tight stave and heading manufacture is now centered in the northern section through Bowie, Titus, and Red River Counties. Several Arkansas mills also draw materials from this region. Recently, however, the industry has expanded into other sections of East Texas. One new mill is now operating in central East Texas and at least two more are being set up.

Three types of tight staves and heading are now being manufactured:

1. Bourbon: of high-quality white oak.
2. Export: of high-quality white oak, but allowing more defect than bourbon.
3. Oil: of good-quality hardwoods--white and red oak, gum, magnolia, etc.

Bourbon and export staves are usually graded, but since classifications vary with the manufacturer, the grades are not given here. Specifications for bourbon and oil staves and heading are given in the appendix, pp. 30-32. Companies making finished heading may also purchase small quantities of hickory for making dowels. Bourbon stave makers often ship their output to a cooperage plant where the staves are sorted for use in the most suitable product. A few plants make finished staves and heading, but more often staves are shipped rough and occasionally undried.

Demand for stave wood is strong and competition between buyers correspondingly keen, particularly for white oak that will yield bourbon staves. Prices for the latter are so high that other cooperage producers cannot compete for high-quality material. Export stave manufacturers, although unable to compete on a per M basis, in some cases pay an equal or greater total stumpage price for a given tract of timber because they can use more of it than bourbon stave outfits. Oil stave producers, few in number, can utilize the lowest grade of tight cooperage material. There is little competition among these companies, but veneer plants compete with them for raw materials.

The suitability of a particular species for staves varies with locality so much that a species highly desired in one county may be rejected in another. Forked leaf white oak is almost always favored, but overcup and post oak may be either very good or practically worthless, depending upon the locality.

Stave manufacturing is highly specialized, and judging stave timber requires considerable experience. Stumpage is seldom purchased

before appraisal by expert stave men. Once it has been determined that a tract has good stave material, the stave buyer will purchase the wood in almost any way the holder will sell--buying the land outright, buying cutting rights (either lump sum or by board measure), by species, by the log or bolt, or even by the individual tree. Rough staves and stave bolts are often split out in the woods. Most operators reported that at least 50 M board feet of timber would be required to set up a profitable operation of this type.

The unit of measure employed varies with the method of purchase. When timber or logs are bought by board measure, the Doyle or Doyle-Scribner scale is used. Bolts, either round or split, are frequently purchased by the cord and occasionally by the unit.^{3/} Rough-split staves are bought by the piece after grading.

The radius of purchase depends on transportation. Truck hauls average about 20 miles and seldom exceed 40. If the stave mill is located on a railroad (as most are), rail hauls of 100 miles and more are possible for logs, bolts, and rough-split staves. Several companies stated that they would put a crew of stave makers almost any place in East Texas where 75 M to 100 M board feet of top-grade white oak were available. All mills are willing to buy any quantity of logs or bolts delivered to the plant, but prefer delivery in truckload or carload lots.

Prices varied little by locality but substantial differences were found among operations. Stumpage prices for top-quality white oak suitable for bourbon stave production ranged from \$22.50 per M up to \$80 with an average of around \$45 to \$50 per M (Doyle-Scribner scale). One manager of a typical stave and heading operation now producing chiefly heading quoted the following prices for logs delivered at the mill:

Post oak	\$35 per M
Overcup oak	\$45 per M
White oak	\$65 per M.

Post oak and overcup oak stumpage for oil staves averaged about \$12 per M, as did gum. Oil stave logs averaged from \$35 to \$40 per M, while quartered bolts averaged \$18 per unit. White, post, and overcup oak of export stave quality averaged \$25 to \$30 per M stumpage and \$35 to \$45 per M for logs delivered to the mill. Prices for rough-split white oak export staves were about as follows:

Wide #1	25¢ per stave
Narrow #1	19¢ per stave
Narrow #2	7¢ per stave.

^{3/} A unit of stave bolts is a stack of bolts 4 feet high and 12 feet long. Standard bolt sizes range from 32 to 38 inches in length. See specifications for standard stave lengths, appendix, pp. 30-31.

Handle Stock

Handle plants in East Texas vary from large factories using electric-powered, automatic machinery capable of producing around two million finished handles each month to small home-factory types with a monthly output of about 2,000 pieces. Finished products include nearly all types of handles--broom handles of pine and hardwood; garden implement handles of ash, hickory, and oak; brush handles of all types; ax, maul, cant hook, and sledge handles of hickory. During the war large numbers of signal flag handles, smoke grenade holders, and heavy duty mop handles were manufactured. With such a range of products and manufacturing equipment it is not surprising that raw material requirements differ widely.

Demand for the finished handles is very high. Raw material needs vary among plants and may change with the season. One small operator reported no difficulty whatever in obtaining wood, while one large company claimed that shortage of handle stock was holding production to less than one-half of capacity. Another company buys oak and hickory during the winter when ash is unobtainable but accepts only ash in other seasons.

Competition for raw materials is stiff between handle companies and makers of other products, but not among handle makers themselves. Picket fence companies needing lath frequently compete, while many sawmills prefer to utilize slabs and edgings for molding rather than handle stock.

One large company operates entirely on sawmill waste. Slabs and edgings are fed through a machine that cuts uniform handle stock (called handle squares) $4\frac{1}{4}$ or $5\frac{1}{4}$ inches square and of various lengths. This company contracts for the entire output of individual mills and also buys squares by board measure and by the thousand pieces from other producers. All species but elm are readily taken.

Handle squares are normally purchased from sawmills with no maximum or minimum quantity specified. Squares should be either kiln- or air-dried, although one factory was accepting green stock from large producers and seasoning it in the factory's own yard. Ceiling prices for dry pine handle squares, f.o.b. producer's ship-pine point, are given in Table 4, together with usual sizes and the number of pieces per 1,000 board feet. For oak prices add \$2 and for gum add \$1 per 1,000 board feet to those quoted for pine.

Table 4.—Ceiling prices on pine handle squares,
kiln-dried or air-dried

Size (inches)	Board feet per M pieces	Price per M b.m.	Price per M pieces
- - - - Dollars - - - -			
4/4 x 24	167	40.50	7.00
36	250	40.50	10.00
42	292	49.50	14.50
48	333	49.50	16.50
54	375	49.50	18.50
60	416	50.50	21.00
72	500	50.50	25.00
96	666	50.50	33.50
5/4 x 42	456	49.50	22.50
48	520	49.50	25.50
54	585	50.50	29.50
60	651	50.50	33.00
72	781	50.50	39.50
96	1042	50.50	52.50

Small, home factory handle plants are often good markets for certain species. One small plant making various types of turned handles (ax, cant hook, sledge, etc.) purchases "white" hickory (hill hickory rejected) in bolts 3 feet long or logs in multiples of 3 feet with a 1-inch trim allowance for each 3 feet. A minimum top diameter of 6 inches is required. Material is supplied chiefly by farmers and other small producers who bring in small truckloads of logs. This adequately fills present small requirements, but planned expansion may require a more dependable supply system. Logs were purchased at a straight \$30 per M board feet, Doyle-Scribner scale. The manager planned to buy bolts by the piece or by the cord, but had not yet worked out prices.

Another company specializing in ash implement handles has in the past obtained all its raw material as ash bolts 5 feet 4 inches long with a minimum top diameter of 8 inches. Now, however, it has been forced to buy some ash logs. Since the factory is on a railway, it can ship in logs and bolts from considerable distances. One gondola carload of average size bolts or logs scales about 4 or 5 M board feet. The Doyle scale for 5-foot logs is the unit of measure (Table 5).

Table 5.— <u>Doyle scale for 5-foot logs</u>			
Diameter	Scale	Diameter	Scale
Inches	Bd.ft.	Inches	Bd.ft.
8	5	14	31
9	8	15	37
10	12	16	45
11	15	17	53
12	20	18	61
13	25	19	70
		20	80

Prices are f.o.b. producer's shipping point. They vary from \$37.50 to \$40.00 per M b.m. for average ash logs or bolts, up to \$50.00 per M for good ash logs or bolts.

Fuelwood

Probably the least developed, most poorly organized, and most variable East Texas forest product market is that for fuelwood. Fuelwood producers are usually independent operators able to finance only very small operations. Farmers make and use much fuelwood but seldom sell appreciable amounts. Much of the fuelwood burned in lumber-producing centers is sawmill waste which may frequently be had for the asking or at a nominal charge.

Demand for most fuelwood is seasonal---strong during the winter but practically non-existent in summer. Roadside barbecue stands provide a profitable though very limited market for hickory with less variation in demand than the normal fuelwood market.

Round fuelwood to be sold in cities and towns is normally cut in 14- and 15-inch lengths, though other sizes may be cut to order. Diameter limits are not specified. Fuelwood units of measure are also variable. The face cord, or tier (a stack of wood 4 feet high, 8 feet long, and as wide as the length of the stick), is frequently used. Some sales are made on a truckload basis, others on a "stovewood cord" measurement. One operator defined his selling unit as a "stovewood cord---a stack 4 feet high, 16 feet long, and as wide as the stick length."

With such variation in units, prices are not easily compared. In rural areas and small towns, price varies with length of stick, but averages around \$9 per stovewood cord. Hickory prices run considerably higher, averaging about \$14 per truckload (usually 20-inch or longer lengths). Prices in large cities are much higher, but vary so greatly that quotations are of little value. One Houston company buys waste from a stave mill at \$7 per standard cord, f.o.b. producer's shipping point. Within 30 miles of this producer is another stave mill which sells its waste for 25¢ a load in the summer, and up to \$5 per load during the winter months.

When fuelwood is purchased as stumpage, the standard cord is the unit of measure. Stumpage prices average not over \$1.50 per cord. Many operators do not purchase any stumpage as such, but contract to clean up after a logging operation and thus get their stumpage free of charge.

Other Forest Products

Raw material

Several other possible outlets for rough forest products were located during the survey, though current demand is limited or lacking.

Between 1940 and 1945 railroads bought many driving poles for use in stabilizing their roadbeds, particularly on curves. Apparently this program is complete, and there is no present market for driving poles. Specifications, which vary between companies, are illustrated in the appendix, page 32. Railroads were usually supplied through their established tie producers. Prices ranged up to 30¢ per pole.

Certain copper smelting companies offer a market, now quite limited but perhaps capable of expansion, for low-grade hardwoods. Hardwood logs--called fuel poles or furnace poles--are used to assist slag formation and the removal of impurities from the molten copper. Specifications for these fuel poles are given in the appendix, page 33. The poles are purchased on contract, at about \$6 per ton, f.o.b. The company now supplying this market obtains all required poles from its own land.

Cedar chest companies usually buy finished lumber. However, one new company which plans to locate in southern East Texas intends to buy redcedar logs and carry the manufacture through to the finished product.

One lumber company has been supplying considerable quantities of pine mine props to a Mexican corporation for many years. This is not a general market, but is perhaps capable of expansion.

Remanufactured products

Wood-using industries are springing up in nearly every community of East Texas. Practically every town of 2,000 population or over has at least one cabinet shop, venetian blind factory, sash and door factory, novelty shop, or some similar establishment either operating now or planned for the near future. While in the aggregate their wood requirements are considerable, these plants seldom offer any market for raw forest products.

(Appendix follows)

Product
Sawlogs
Pulpwood
Poles
Piling
Posts
Cross tie
Box, basket, and crate material
Handle stock
Fuelwood

				EAST T
Product	General requirements of market <u>1/</u>	Purchased as--	Purchase point	
Sawlogs	Logs--10 in. top and over, 8 ft. to 16 ft. long.	Stumpage	Woods	V
		Sawlogs	Roadside Mill	V
Cross-ties	Specifications vary with railroads. All ties must be sound. Sizes are standard.	Stumpage	Woods	M
		Sawed or hacked ties	Tie yard	S
Box, basket, and crate material.	Veneer logs and bolts must be sound, reasonably free of knots. Bolt sizes variable.	Stumpage	Woods	V
		Sawlogs	Roadside Mill	V
		Bolts	Mill	T
Cooperage material	Bourbon heading or stave quality material. White oak group.	Stumpage	Woods	5
		White oak logs	Mill	T
		O'cup oak logs	Mill	T
		Post oak logs	Mill	T
	Export stave quality. Any species of white oak group.	Stumpage	Woods	5
		Logs	Mill	T
		Rough-split staves	Mill	5
	Oil stave hardwoods. Red, white, post, and overcup oaks, & gum, magnolia, etc.	Stumpage	Woods	M
		Logs	Mill	M
Quartered bolts		Mill	M	
Handle stock	Handle squares made from slabs and edgings. Purchased on contract.	Squares	F.o.b. mill	M
	Hickory	Logs	Mill	M
	Ash	Logs and bolts	Mill	C
Pulpwood	Sticks 5 ft. long. Amount limited. <u>2/</u>	Stumpage	Woods	
		Cut wood	Woods	
Fuelwood	Mixed hardwoods	Stumpage	Woods	H
		Cut wood	Consumer	N
	Hickory	Cut wood	Consumer	N

1/ For de
2/ "Tract
 Doyle rule

1/ For detailed specifications, see appendix, pp. 21-33.
2/ "Tract" signifies lump sum or boundary sale; "M b.f." 1,000 board feet by the Doyle-Scribner log rule.

EAST TEXAS PINE MARKETS

Product	General requirements of market 1/	Purchased as--	Purchase point	Minimum quantity accepted	Unit of measure 2/	Price per unit 3/		
						Maximum	Minimum	Average
Sawlogs	Logs--6 in. top and over, 8 to 24 feet long.	Stumpage	Woods	Mill set: 100,000 bd. ft. Min. cut: 800-1000 bd. ft. per acre	Tract	...	...	...
			Roadside	Varies with quality and distance	M b.f.	\$25	\$8	\$18
		Sawlogs	Mill	Truckload	M b.f.	Varies with quality and distance		
Pulpwood	Sticks--usually 5 ft., sometimes 4 ft. long; 24-in. max. diameter, 4-in. min. diameter.	Stumpage	Woods	3 to 5 cords per acre	Tract	...	...	...
			Woods		Cord	\$2.00	\$1.20	\$1.50
		Cut wood	Roadside	Truckload or more	Pen	\$1.00	\$1.00	\$1.00
			Railside		Cord	...	...	\$5.00
			Mill		Cord	...	...	\$7.50
			Mill		Cord	\$9.75	\$7.75	\$9.75
Poles	Poles must meet ASA or REA specifications. Size classes are standard.	Stumpage	Woods	About 10 poles per acre, but varies with size	Tract	...	...	...
					Piece	30% to 50% of delivered price		
		Peeled poles	Plant	Truckload or less	Piece	Class. 30 ft. 35 ft. 60 ft. 75 ft.		
						1 \$19.90 \$42.50		
						2 16.90 36.25		
						5 \$2.85 \$3.70		
Piling	Must meet Navy, Army, or ASA specifications for piling.	Stumpage	Woods	Variable	Tract	...	...	...
					Piece	30% to 40% of delivered price		
		Peeled piling	Plant	Truckload or less	Piece	Price scaled by length		
					Linear ft.	14¢		
Posts	Clean, peeled posts for treating	Peeled posts	Plant	Truckload or less	Piece	Top 6 ft. 7 ft. 8 ft.		
						3" \$0.12½ \$0.14 \$0.16		
						4" .14 .16 .18½		
						5" .15½ .18 .21		
						6" .17 .23 .29		
Cross tie	Specifications vary with railroads. All ties must be sound. Sizes are standard.	Stumpage	Woods	Mill set-up: 5,000 ties Hacking: about 20 ties per acre	Tract	...	...	...
					Piece	25% of delivered price		
		Sawed or hacked ties	Tie yard	Single ties accepted at tie yard	Piece	Class: 1 Price \$0.60		
						2 .80		
						3 .95		
						4 1.15		
Box, basket, and crate material	Poor-quality logs for box shook; veneer logs and bolts must be fairly free of knots.	Stumpage	Woods	Variable	Tract	...	...	...
					M b.f.	\$25	...	\$18
		Sawlogs	Mill	Truckload	M b.f.	\$40	\$30	\$35
		Bolts	Mill	Truckload	M b.f.	\$40	\$30	\$35
Handle stock	Handle squares made from slabs and edgings. Purchased on contract.	Squares	F.o.b. mill	1,000 bd. ft.	Bd. ft.	From \$40 to \$50 per M.		
				No minimum	1,000 pieces	From \$7 for 4/4 x 24" up to \$52.50 for 5/4 x 96"		
Fuelwood	Round pine or slabs and edgings.	Stumpage	Woods	Variable	Tract	...	...	...
					Stovewd. cord	...	...	\$1.50
		Cut wood	Consumer	Variable	Tier	...	...	\$8.00

1/ For detailed specifications, see appendix, pp. 21-53.

2/ "Tract" signifies lump sum or boundary sale methods; "M b.f." 1,000 bd. ft. log scale by Doyle rule for lumber stumpage and sawlogs and Doyle-Scribner for box, basket, and crate material.

3/ For complete price lists of poles and handle stock as of mid-1946, see text.

TEXAS HARDWOOD MARKETS

Minimum quantity accepted	Unit of measure 2/	Price per unit		
		Maximum	Minimum	Average
aries with quality and location.	Tract	...	...	...
iv.min. of 1200 bd. ft. per acre.	M b.f.	\$15	...	\$8
variable	M b.f.	Varies with quality and distance		
truckload	M b.f.	\$30	\$17	\$23
ill set-up: 5,000 ties.	Tract	...	...	...
lacking: about 20 ties per acre.	Piece	25% of deliv.price or 15-25¢ ea.		
Single ties accepted at most ie yards.	Piece	Class	Oak	Gum
				Mixed
		1	\$0.65	\$0.60
		2	.90	.85
		3	1.05	1.00
		4	1.20	1.20
		5	1.30	1.30
aries with quality, distance	Tract	...	...	...
rom mill, species, etc.	M b.f.	\$20	\$8	\$14
variable	M b.f.	\$35	\$25	\$30
truckload	M b.f.	\$40	\$30	\$37
truckload	M b.f.	\$40	\$30	\$37
0 M bd. ft. for setting	Tract	...	...	...
	M b.f.	\$80	\$22.50	\$50
truckload	M b.f.	...	...	\$65
truckload	M b.f.	...	...	\$45
truckload	M b.f.	...	...	\$35
0 M bd. ft. for setting	Tract	...	...	...
	M b.f.	...	...	\$25-\$30
truckload	M b.f.	...	...	\$35-\$45
0 M to 100 M bd. ft. for etting. No minimum if roduced locally.	Piece	Wide No. 1	25¢	
		Narrow No. 1	19¢	
		Narrow No. 2	7¢	
o minimum.	Tract	...	...	...
	M b.f.	...	...	\$12
o minimum. Single logs taken.	M b.f.	...	...	\$35-\$40
o minimum.	Unit	...	...	\$18
,000 bd. ft.	Bd. ft.	From \$41 to \$52 per M b.f.		
o minimum.	1,000 pieces	Oak: from \$7.35 per M for 4/4 by 24"up to \$55 for 5/4 by 96"		
		Gum: from \$7.15 per M for 4/4 by 24"up to \$54 for 5/4 by 96"		
o minimum.	M b.f.	\$30 per M.		
arload	M b.f.	\$37.50 to \$50 per M.		
3/	Tract	...	...	...
	Cord	Varies, average about 80¢.		
3/	Pen	80¢ per pen.		
ighly variable.	Stovewd.cord	Maximum of \$1.50		
o minimum.	Tier	\$9 per tier.		
o minimum.	Truckload	\$14 per truckload.		

3/ The only company now buying hardwood pulpwood in East Texas limits amount to 20% of total wood purchased. Most contractors limit the amount of hardwood pulpwood to 20% of total cut from any given tract.

SPECIFICATIONS AND DIMENSIONS FOR
SOUTHERN PINE POLES^{1/}

I. Specifications

1. Material Requirements

1.1 Species. All poles shall be cut from live southern pine timber: Longleaf Pine (Pinus palustris), Shortleaf Pine (Pinus echinata), Loblolly Pine (Pinus taeda), Slash Pine (Pinus caribaea), and Pond Pine (Pinus rigida serotina).

1.2 Prohibited defects. All poles shall be free from decay, red heart, cracks, plugged holes, and bird holes. Nails, spikes, and other metal shall not be present in the poles unless specifically authorized by the purchaser.

1.3 Permitted defects.

1.31 Blue sap stain. Blue sap stain that is not accompanied by softening or other disintegration of the wood (decay) is permitted under these specifications.

1.32 Hollow pith centers. Hollow pith centers in the tops or butts of poles and in knots are permitted.

1.4 Limited defects.

1.41 Checks. The top and side surfaces of poles shall be free from injurious checks.

1.42 Shakes. Shakes in the butt surface extending over not more than one-quarter ($\frac{1}{4}$) of the circumference are permitted provided they are at least one (1) inch distant from the edge of the butt. Shakes extending over more than one-quarter ($\frac{1}{4}$) of the circumference are permitted when they are inside of a circle whose center corresponds to the center of the butt surface and whose diameter equals one-half ($\frac{1}{2}$) of the average butt diameter.

Shakes in the top surface whose width does not exceed one-sixteenth ($\frac{1}{16}$) of an inch are permitted provided they do not extend over more than one-half ($\frac{1}{2}$) of the top circumference.

^{1/} American Standard Specifications and Dimensions for Southern Pine Poles. American Standards Association, 29 West Thirty-Ninth Street, New York, N. Y. 1945.

EAST TEXAS HARDWOOD MARKETS

Product	General requirements of market 1/	Purchased as--	Purchase point	Minimum quantity accepted	Unit of measure 2/	Price per unit		
						Maximum	Minimum	Average
Sawlogs	Logs--10 in. top and over, 8 ft. to 16 ft. long.	Stumpage	Woods	Varies with quality and location. Av. min. of 1200 bd. ft. per acre.	Tract	...	...	...
		Sawlogs	Roadside	Variable	M b.f.	\$15	...	\$8
			Mill	Truckload	M b.f.	Varies with quality and distance	\$17	\$23
Cross-ties	Specifications vary with railroads. All ties must be sound. Sizes are standard.	Stumpage	Woods	Mill set-up: 5,000 ties. Hacking: about 20 ties per acre.	Tract	...	...	...
		Sawed or hacked ties	Tie yard	Single ties accepted at most tie yards.	Piece	25% of deliv. price or 15-25¢ ea.		
						Class	Oak	Gum
						1	\$0.65	\$0.60
						2	.90	.85
Box, basket, and crate material.	Veneer logs and bolts must be sound, reasonably free of knots. Bolt sizes variable.	Stumpage	Woods	Varies with quality, distance from mill, species, etc.	Tract	...	...	...
		Sawlogs	Roadside	Variable	M b.f.	\$20	\$8	\$14
			Mill	Truckload	M b.f.	\$35	\$25	\$30
		Bolts	Mill	Truckload	M b.f.	\$40	\$30	\$37
					M b.f.	\$40	\$30	\$37
Cooperage material	Bourbon heading or stave quality material. White oak group.	Stumpage	Woods	50 M bd. ft. for setting	Tract	...	...	...
		White oak logs	Mill	Truckload	M b.f.	\$80	\$22.50	\$50
		O'cup oak logs	Mill	Truckload	M b.f.	...	...	\$65
		Post oak logs	Mill	Truckload	M b.f.	...	...	\$45
	Export stave quality. Any species of white oak group.	Stumpage	Woods	50 M bd. ft. for setting	Tract	...	...	...
		Logs	Mill	Truckload	M b.f.	...	...	\$25-\$30
		Rough-split staves	Mill	50 M to 100 M bd. ft. for setting. No minimum if produced locally.	M b.f.	...	...	\$35-\$45
	Oil stave hardwoods. Red, white, post, and overcup oaks, & gum, magnolia, etc.	Stumpage	Woods	No minimum.	Piece	Wide No. 1	25¢	
		Logs	Mill	No minimum. Single logs taken.		Narrow No. 1	19¢	
		Quartered bolts	Mill	No minimum.		Narrow No. 2	7¢	
Handle stock	Handle squares made from slabs and edgings. Purchased on contract.	Squares	F.o.b. mill	1,000 bd. ft.	Tract	...	...	...
				No minimum.	Bd. ft.	From \$41 to \$52 per M b.f.		
	Hickory	Logs	Mill	No minimum.	1,000 pieces	Oak: from \$7.35 per M for 4/4 by 24" up to \$55 for 5/4 by 96"		
	Ash	Logs and bolts	Mill	Carload	M b.f.	Gum: from \$7.15 per M for 4/4 by 24" up to \$54 for 5/4 by 96"		
Pulpwood	Sticks 5 ft. long. Amount limited. 3/	Stumpage	Woods	3/	M b.f.	\$30 per M.		
		Cut wood	Woods	3/	M b.f.	\$37.50 to \$50 per M.		
		Stumpage	Woods	Highly variable.	Tract	...	...	...
Fuelwood	Mixed hardwoods	Cut wood	Consumer	No minimum.	Cord	Varies, average about 80¢.		
		Cut wood	Consumer	No minimum.	Pen	80¢ per pen.		
		Cut wood	Consumer	No minimum.	Stovewd. cord	Maximum of \$1.50		
					Tier	\$9 per tier.		
					Truckload	\$14 per truckload.		

1/ For detailed specifications, see appendix, pp. 21-33.

2/ "Tract" signifies lump sum or boundary sale; "M b.f." 1,000 board feet by the Doyle-Scribner log rule.

3/ The only company now buying hardwood pulpwood in East Texas limits amount to 20% of total wood purchased. Most contractors limit the amount of hardwood pulpwood to 20% of total cut from any given tract.

- 1.43 Splits. Splits are prohibited in the top surfaces of poles. Splits in butt surfaces are permitted provided that their height from the butt along the side surfaces does not exceed two (2) feet.
- 1.44 Grain. No pole shall have more than one (1) complete twist of grain in any twenty (20) feet of length.
- 1.45 Insect damage. Insect damage consisting of holes less than one-sixteenth ($1/16$) of an inch in diameter is permitted.
- 1.46 Knots. The diameter of any single knot or knot cavity, or the sum of the diameters of all knots and knot cavities in any one (1) foot section shall not exceed the limits set up in the following table. Knots and knot cavities one-half ($\frac{1}{2}$) of an inch or under in diameter shall be ignored in applying the limitations for sum of diameters.

Limitations of knot size

Length of pole	Maximum sizes permitted, in inches		
	Diameter of any single knot or knot cavity		Sum of diameters of all knots and knot cavities in any one (1) foot section, all classes
	Classes 1-3	Classes 4-10	
45' and under	4	3	8
50' and over	5	5	10

Knots one (1) inch or over in diameter, showing discoloration or softness of fiber, indicating possible decay, shall be neatly gouged to a depth of not more than one-fifth ($1/5$) of the diameter of the pole at the point where the knot is located, to permit determination of the character and extent of decay. The gouging shall be done without unnecessary removal of sound wood, and in such a manner as to insure drainage of water from the hole when the pole is set. Where such gouging does not completely remove the decay (heart rot), the pole shall be rejected.

Knots under one (1) inch in diameter need not be gouged unless after trimming the presence of decay is revealed and upon further examination the decay is found to extend to a depth of more than two (2) inches.

When more than one (1) cavity is present in a pole, the sum of the depths of all cavities in the same six (6) inch longitudinal section of the pole shall not exceed one-third ($1/3$) of the mean diameter of that section.

- 1.47 Scars. No pole shall have a turpentine face or other scar located within two (2) feet of the ground line.

In other sections of the pole, scars which have been smoothly trimmed so as to remove all bark and all surrounding or overhanging wood that is not completely intergrown with the wood of the body of the pole are permitted, provided (a) that such trimming does not result in abrupt changes in the contour of the pole surface and that the trimmed scar does not have a depth of more than one (1) inch, except that where the diameter of the pole at the location of the scar is more than ten (10) inches the depth may be one-tenth ($1/10$) of the diameter; and (b) that the circumference of the pole at any point on trimmed surfaces located between the butt and a point two (2) feet below the ground line is not less than the circumference of the pole at the ground line.

- 1.48 Shape. Poles shall be free from short crooks. A pole may have sweep subject to the following limitations:

- (a) Where sweep is in one (1) plane and one (1) direction only, a straight line joining the surface of the pole at the ground line and the edge of the pole at the top shall not be distant from the surface of the pole at any point by an amount greater than one (1) inch for each six (6) feet of length between these points.
- (b) Where sweep is in two (2) planes (double sweep) or in two (2) directions in one (1) plane (reverse sweep), a straight line connecting the mid-point at the ground line with the mid-point at the top shall not at any intermediate point pass through the external surface of the pole.

2. Dimensions

- 2.1 Length. Poles under fifty (50) feet in length shall not be over three (3) inches shorter or six (6) inches longer than nominal length. Poles fifty (50) feet or over in length shall not be over six (6) inches shorter or twelve (12) inches longer than nominal length.

Length shall be measured between the extreme ends of the pole.

- 2.2 Circumference. Poles shall be classified in accordance with the table of dimensions shown as Part II of this standard. Minimum allowable circumferences at six (6) feet from the butt (except for Classes 8, 9, and 10), and at the top, for each length and class of pole listed, are shown in this table. Poles having circumferences which are greater, at the same

points of measurement, than those shown for the length and class desired, shall be acceptable, provided that the six (6) foot from butt circumference is less than the minimum given for the second larger class pole of the same length. The top dimensional requirement shall apply at a point corresponding to the minimum length permitted for the pole.

3. Manufacturing Requirements

- 3.1 Bark removal. Outer bark shall be completely removed from all poles. No patch of inner bark left on the pole surface shall be more than one-quarter ($\frac{1}{4}$) of an inch in width or more than four (4) inches long.
- 3.2 Sawing. All poles shall be neatly sawed at the butt along a plane which shall not be out of square with the axis of the pole by more than two (2) inches per foot of diameter of the sawed surface. Beveling at the edge of the sawed butt surface not more than one-twelfth ($\frac{1}{12}$) of the butt diameter in width, or an equivalent area unsymmetrically located, is permitted.
- 3.3 Trimming. Branch stubs, partially overgrown knots, and completely overgrown knots rising more than one (1) inch above the pole surface shall be trimmed close. Completely overgrown knots less than one (1) inch high need not be trimmed.

II. Dimensions

Dimensions for creosoted southern pine poles

Class		1	2	3	4	5	6	7	8	9	10
Min. Top Circ. (inches)		27	25	23	21	19	17	15	18	15	12
Length of pole (feet)	*Ground line dist. from butt (feet)	Minimum circumference at six feet from butt (inches)									
16	3½					21.5	19.5	18.0	No butt requirement		
18	3½			26.5	24.5	22.5	21.0	19.0			
20	4	31.5	29.5	27.5	25.5	23.5	22.0	20.0			
22	4	33.0	31.0	29.0	26.5	24.5	23.0	21.0			
25	5	34.5	32.5	30.0	28.0	26.0	24.0	22.0			
30	5½	37.5	35.0	32.5	30.0	28.0	26.0	24.0			
35	6	40.0	37.5	35.0	32.0	30.0	27.5	25.5			
40	6	42.0	39.5	37.0	34.0	31.5	29.0	27.0			
45	6½	44.0	41.5	38.5	36.0	33.0	30.5	28.5			
50	7	46.0	43.0	40.0	37.5	34.5	32.0	29.5			
55	7½	47.5	44.5	41.5	39.0	36.0	33.5				
60	8	49.5	46.0	43.0	40.0	37.0	34.5				
65	8½	51.0	47.5	44.5	41.5	38.5					
70	9	52.5	49.0	46.0	42.5	39.5					
75	9½	54.0	50.5	47.0	44.0						
80	10	55.0	51.5	48.5	45.0						
85	10½	56.5	53.0	49.5							
90	11	57.5	54.0	50.5							

* The figures in this column are intended solely for use whenever a definition of ground line is necessary in order to apply specification requirements relating to scars, straightness, etc.

SPECIFICATIONS FOR PILING^{2/}

The piling shall be cut from live, sound trees, shall be solid and free from defects such as injurious ring shakes, large, unsound or loose knots, decay, knots in clusters, groups of single knots, or other defects which might impair the strength and durability. Sound knots will be permitted provided they are not in clusters and do not exceed one-third ($1/3$) of the small diameter or least dimension, and are not over four (4) inches in diameter. Any defect or combination of defects which would be more injurious than the maximum allowable knot will not be permitted.

All knots shall be trimmed close to the body of the pile. Piling shall be cut from above the ground swell and have a uniform taper. A line drawn from the center of the butt to the center of the tip shall not fall outside of the center of the pile at any point more than one (1) percent of the length of the pile. In short bends, the distance from the center of the pile to a line stretched from the center of the pile above the bend to the center of the pile below the bend shall not exceed four (4) percent of the length of the bend or two and one-half ($2\frac{1}{2}$) inches. The piling shall be peeled soon after cutting. All of the rough bark and at least eighty (80) percent of the inner bark shall be removed. No strip of inner bark remaining on the pile shall be over three-fourths ($3/4$) inch wide or over eight (8) inches long, and there shall be at least one (1) inch of clean wood surface between any two (2) strips. Square piling shall be uniform in cross-section not less than ten (10) by twelve (12) inches for lengths over thirty (30) feet.

The minimum diameter of round piling at a section four (4) feet from the butt, measured under the bark, and the minimum diameter of the tip shall be as follows:

<u>Length of pile</u>	<u>Min. diameter 4' from butt</u>
40' and under	12 inches
Over 40'	13 inches
<u>Length of pile</u>	<u>Min. diameter of tip</u>
30' and under	9 inches
31' to 50'	8 inches
Over 50'	7 inches

The maximum diameter of the butt shall be twenty (20) inches. Ends must be squared.

^{2/} In use by local wood preservation plant in purchase of piles for treating. For more detailed specifications see "Standard Specifications for Round Timber Piles." ASTM designation: D25-37, American Society for Testing Materials, Philadelphia, Pa.

3/

SPECIFICATIONS FOR CROSS TIES
1934

I. Material

101. Kinds of Wood*

Before manufacturing ties, producers shall ascertain which of the following kinds of wood suitable for cross ties will be accepted:

Ashes	Cypresses	Hickories	Poplars
Beech	Douglas fir	Larches	Redwoods
Catalpas	Elms	Locusts	Sassafras
Cedars	Firs (true)	Maples	Spruces
Cherries	Gums	Mulberries	Sycamores
Chestnut	Hackberries	Oaks	Walnuts
Birches	Hemlocks	Pines	

Others will not be accepted unless specially ordered.

II. Physical Requirements

201. General Quality

Except as hereinafter provided, all ties shall be free from any defects that may impair their strength or durability as cross ties, such as decay, large splits, large shakes, large or numerous holes or knots, grain with slant greater than 1 in 15.

202. Resistance to Wear

When so ordered, ties from needleleaved trees shall be of compact wood throughout the top fourth of the tie, where any inch of any radius from the pith shall have 6 or more rings of annual growth.

203. Resistance to Decay

Ties for use without preservative treatment shall not have

3/ Extracted from Specifications for Cross-Ties, 1934. American Railway Engineering Association, Construction and Maintenance Section, Association of American Railroads. For further information, see complete specifications or discuss with nearest tie buyer.

* Each railway will specify only the kind or kinds of wood it desires to use.

sapwood wider than $\frac{1}{4}$ the width of the top between 20 inches and 40 inches from the middle of the tie, and will be designated as "heart" ties. Those with more sapwood will be designated as "sap" ties.

III. Design

301. Dimensions

- a. Before manufacturing ties, producers shall ascertain which of the following lengths, shapes, or sizes will be accepted, and whether ties are to be hewed or sawed, and in either case whether on the sides as well as on the top and the bottom.
- b. Except as hereinafter provided, standard-gage railway ties shall be 8 feet, 8 feet 6 inches, or 9 feet long.
- c. Except as hereinafter provided, ties shall measure as follows throughout both sections between 20 inches and 40 inches from the middle of the tie:

Size	Sawed or hewed top, bottom and sides	Sawed or hewed top and bottom
0	5 inches thick by 5 inches wide on top*	5 inches thick by 5 inches wide on the top
1	6 inches thick by 6 inches wide on top*	6 inches thick by 6 inches wide on top
2	6 inches thick by 7 inches wide on top	6 inches thick by 7 inches wide on top
3	6 inches thick by 8 inches wide on top	<div style="display: inline-block; vertical-align: middle;"> <div style="font-size: 3em; vertical-align: middle; margin-right: 5px;">{</div> <div> 6 inches thick by 8 inches wide on top 7 inches thick by 7 inches wide on top ** </div> </div>
4	7 inches thick by 8 inches wide on top	7 inches thick by 8 inches wide on top
5	7 inches thick by 9 inches wide on top	7 inches thick by 9 inches wide on top
6	7 inches thick by 10 inches wide on top	7 inches thick by 10 inches wide on top

* None accepted in standard-gage railway ties.

** Railways which specify both 6-inch x 8-inch and 7-inch x 7-inch ties, sawed or hewed on top and bottom only, and which desire to separate the 6-inch from the 7-inch ties will designate the 7-inch x 7-inch as Size 3A.

IV. Manufacture

401. Except as hereinafter provided, all ties shall be straight, well hewed or sawed, cut square at the ends, have bottom and top parallel, and have bark entirely removed.

V. Inspection

503. Decay

The following decay will be allowed: In cedar and in cypress, "pipe or stump rot" and "peck," respectively, up to the limitations as to holes; in chestnut, "bark disease" up to $\frac{1}{4}$ inch deep. "Blue stain" is not decay and is permissible in any wood.

504. Holes

A large hole, other than one caused by "pipe or stump rot" in cedar, is one more than $\frac{1}{2}$ inch in diameter and 3 inches deep within, or more than $\frac{1}{4}$ the width of the surface on which it appears and 3 inches deep outside, the sections of the tie between 20 inches and 40 inches from its middle. A cedar tie with a pipe or stump rot hole more than $1\frac{1}{2}$ inches in diameter and 15 inches deep will be rejected. Numerous holes are any number equaling a large hole in damaging effect. Such holes may be caused in manufacture or otherwise.

505. Knots

A large knot is one whose average diameter exceeds $\frac{1}{4}$ the width of the surface on which it appears; but such a knot may be allowed if it occurs outside the sections of the tie between 20 inches and 40 inches from its middle. Numerous knots are any number equaling a large knot in damaging effect.

506. Shake

One which is not more than one-third the width of the tie will be allowed.

507. Split

One which is not more than 5 inches long will be allowed, provided sufficient satisfactory anti-splitting devices have been properly applied.

508. Manufacture

(a) A tie will be considered straight: (1) when a straight line along the top from the middle of one end to the middle of

the other end is entirely within the tie; and (2) when a straight line along a side from the middle of one end to the middle of the other end is everywhere more than 2 inches from the top and the bottom of the tie.

- (b) A tie is not well hewed or sawed when its surfaces are cut into with scoremarks more than $\frac{1}{2}$ inch deep or when its surfaces are not even.
- (c) The top and bottom of a tie will be considered parallel if any difference in the thicknesses at the sides or ends does not exceed $\frac{1}{2}$ inch.

509. Dimensions

- (a) The lengths, thicknesses and widths specified are minima for the standard sizes. Ties over 1 inch longer, thicker or wider than the standard size ordered will be rejected.
- (b) All thicknesses and widths apply to the sections of the tie between 20 inches and 40 inches from the middle of the tie. All determinations of width will be made on the top of the tie, which is the narrower of the horizontal surfaces, or the one with narrower or no heartwood if both horizontal surfaces are of the same width.

SPECIFICATIONS FOR TIGHT COOPERAGE MATERIAL^{4/}

Sawed Spirit Bourbon and Rye Whiskey Barrel Staves

Shall be manufactured of sound, live white oak and species of sound, live white oak that will be suitable for the purpose, sawed with the grain from straight grain bolts, and equalized 34, 35, or 36 inches long, as agreed, to be evenly sawed and of uniform thickness throughout, and when thoroughly kiln-dried to be full $\frac{3}{4}$, $\frac{7}{8}$, or 1 inch thick, respectively, when planed on inside or outside; and full $\frac{13}{16}$, $\frac{15}{16}$, and $1-\frac{1}{32}$ inches thick, respectively, when not planed. To average in width when kiln-dried and jointed, free of sap, not exceeding 25 staves, to the barrel of 81 inches, and to be free of seed or worm holes of any kind, cat faces or checks, but permitting in 5 percent of a shipment one worm hole in a stave, provided

^{4/} Extracts from Grade Rules and Specifications adopted by the Tight Cooperage Group of the Associated Cooperage Industries of America, Inc. For specifications for other tight cooperage materials see "The wooden barrel manual," The Associated Cooperage Industries of America, pp. 57-65. (N.d.)

there is no sign of defect around the worm hole. One pore streak that does not go through stave will be admitted, provided it is on inside of stave and does not go into the stave more than 1/8 inch deep. The grain of the stave must be such that a straight line drawn at right angles across the thickness at the ends of a stave must pass through not less than three lines of grain at any one place, but in no case shall the angle of the grain be greater than 45 degrees.

White and Red Oak Oil Barrel or Tierce Staves*

Shall be equalized, 34, 35, or 36 inches long as agreed, and to be when thoroughly dry, 3/4 inch thick, evenly sawed and of uniform thickness throughout; to average in width when close jointed, including sound sap, not exceeding 25 staves to the standard barrel. To be free from seed holes, cat faces which show through on both sides, wind shakes and rotten sap.

It will be permissible to furnish kiln-dried and jointed staves of the above dimension, in bundles not to exceed 25 staves to a bundle, provided said bundles contain at least 10 percent wide staves for bung staves averaging not less than 4 inches.

Bourbon Barrel Heading (Square)

Shall be sawn from white oak timber, suitable for the purpose and with the grain as nearly as practicable, but in no case shall the angle of the grain be greater than 45 degrees.

Thickness when air-dried to be such as will finish 1 inch; but in no case shall heading be sawed green under 1-3/16 inches in thickness.

Bird pecks, also shallow cat faces and spot worms, on one side, which do not penetrate more than 1/8 inch, will be permissible, but in not over 5 percent of pieces.

Porous streaks on one side, that do not go through the heading and are not over 1/4 inch deep, showing in end or ends of piece, are permissible.

One sound worm hole in not over 5 percent of pieces permissible, except no worm hole that would appear in top bevel of head, is permitted.

* These specifications also apply to gum stores and to gum mixed timber. For species requirements contact local stave buyer.

Oak and Ash Oil Barrel and Tierce Heading*

Cat faces, bird pecks, and spot worms, which do not show through on both sides, permissible.

Streaks and discolored sound sap (no rotten sap), permissible.

Not to exceed 5 worm holes in one piece and in not more than 10 percent of pieces, permissible.

No pumpkin ash permitted.

SPECIFICATIONS FOR DRIVING POLES^{5/}

1. Lengths as specified--principally 8 feet.
2. Poles are unpeeled--sawn square on both ends, and sufficiently straight for driving without danger of breakage.
3. Species--Pine and all kinds of southern hardwood will be acceptable.
4. Condition--Poles must be sound and cut from live trees. Production must be so arranged that poles are loaded on cars for shipment or stacked on yard adjacent to loading tracks within 10 days after tree is felled.
5. All limbs and knots must be trimmed flush with the bark of the timber.
6. Poles may have a minimum 5-inch tip provided butt diameter is not less than 8 inches, but poles with the minimum 7-inch butts must be 6 inches or more at the tip. Maximum butt diameters 10 inches. All tip and butt measurements are made under the bark.

* These specifications also apply to gum and other heading species. For species requirements, contact your local stave or heading buyer.

^{5/} Each railroad company has its own specifications for this product. The above specifications are given as an example of the driving pole specifications used by one company.

6/

SPECIFICATIONS FOR FUEL POLES

All furnace poles and furnace brands to be oak or hickory wood, must be freshly cut and green, with the bark on when delivered. The furnace poles must be reasonably straight throughout their entire length and must range from 28 to 32 feet in length, 50 percent by weight to weigh not less than 800 pounds each and no poles to weigh less than 500 pounds when delivered. They must not be over 18 inches in diameter at the butt end, nor less than 10 inches in diameter at the butt end. Reasonably straight shall mean that the poles are to be free from abrupt curve or offset at a knot or growth. All branches to be cut closely to body of the poles.

6/ There are no standard specifications for fuel poles. The above specifications are those followed by one supplier of this product.

